REMARKS/ARGUMENTS

Claims 22-32 are pending. New Claims 31 and 32 been added. The Office Action rejected Claims 22-30 under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,595,052 to Wharton.

The specification was objected to because of various matters. Applicant encloses herewith a Substitute Specification in marked-up and clean forms in order to correct these matters. A new Abstract is also enclosed herewith.

Response to Rejections

Claims 22-28

The invention defined by Claim 22 concerns a gripping device for a manipulation system comprising a robot for receiving parts and feeding a manufacturing plant with a workpiece from a readied stack of workpieces. The gripping device for this manipulation system comprises a gripper head supporting gripping means, and a detection system for detecting a workpiece received by the gripping means. The gripping device also comprises at least one pulse emitter acting upon the workpiece to excite vibrations in the workpiece, and at least one vibration sensor for sensing the vibrations of the workpiece, and a memory and/or analytical module structured and arranged to conduct a vibration analysis on a vibration signal from said vibration sensor. The detection system and the memory and/or analytical module jointly form a component part detachably arranged on the gripper head and in communication with a controller of the manufacturing plant via a bus system comprising an ASi bus.

Wharton relates to an entirely different field of endeavor. Wharton describes a self-calibrating workpiece balancing machine that is able to automatically determine and correct the imbalance of rotating parts and to automatically self-calibrate under predetermined operating conditions. The machine has one or more automatic load or force injecting units ("unbalance injection devices") that are said to provide hands-free selection and changing of calibration loads

and, along with other machine equipment, cooperate to form a self-calibrating workpiece balancing machine. Via these unbalance injection devices, known unbalancing loads are automatically injected into the rotating chucks or other workpiece mountings of the machine to establish inertia axes offset from the rotational axis of a standard or master workpiece rotatably driven therein. Known moments are resultantly established at predetermined correction planes that extend through the workpiece, whose values are fed to a balance computer of the machine for the automatic calibration thereof.

Wharton's machine **10** includes a workpiece holding unit or chuck **14** forming an extension of a cylindrical spindle **16**. The chuck **14** holds a workpiece **12**. A motor **28** rotatably drives the spindle for the rotational drive of the workpiece **12** about spin axis **18**.

The spindle also operatively mounts an unbalance injector device **42** operatively associated with the machine, which can be set to inject predetermined unbalancing loads into the rotating standard or master workpiece **12** for calibrating the work piece balancing machine **10**. The unbalance injector device **42** has a pair of interior counter-weight rings **44**, **46** (FIG. 1a) operatively mounted to a rotatable upper, axially extending shaft portion of the spindle or to the rotatable workpiece holding unit **14** of the spindle. The unbalance force injection unit further comprises a driver **48** having a coil assembly **50** spaced from and disposed outwardly of the rings **44**, **46** mounted on a housing of the spindle or other stationary component **52**.

When a predetermined unbalancing load is required for calibrating purposes, electronic controller **54** (FIG. 3) operatively connected to the coil assembly by line **56** is activated by the balance computer **60** to initiate load injections on signals transmitted from the balance computer through line **59** connecting the controller to the balance computer. The controller **54** is accordingly operative to send power pulses to the coil assembly of the driver **48** of the unbalance injector device and effect the electromagnetic rotational stepping of the counter-weight rings **44**, **46** to different predetermined rotary positions. Rotation of the rings to different preestablished positions results in the application or injection of a predetermined imbalance load into a base or injection plane IP extending through the workpiece holding end of the spindle.

For machine calibration, the known unbalancing load is translated from the rotating spindle of the machine to the attached rotating master work piece **12** and particularly to a location on the master that is in a predetermined calibration or correction plane **CP**. This calibration plane extends thorough the master at a set distance from the base or injection plane and is parallel thereto.

The unbalance injector device **42** of the embodiment of FIGS. 1-3 is adjusted and set by the controller to automatically inject the predetermined unbalancing load into the spindle or chuck of the machine when the machine drives the work piece to a predetermined rpm. This unbalancing load is subsequently injected into the work piece **12** as a transversely oriented load and in the transverse calibration or correction plane extending therethrough for calibration proposes. This known unbalancing load is physically applied to the rotating workpiece holding component of the machine by the displaced rings **44, 46** of the rotating components of the unbalance injection device and by translation to the workpiece **12** in the predetermined correction plane **CP** thereof.

The balance computer **60** is programmed to effect the calculations necessary to effect the balancing of workpieces being processed by the machine **10** . The balancing computer is calibrated with the functional workpiece imbalance positional signals from a synchronizer pick up **62** positioned adjacent the workpiece holder unit **14** or the workpiece itself. Additionally, electrical signals generated by unbalanced workpiece vibrations are fed into the balance computer **60** from a vibration pick up **66** that is operatively connected to one of the support springs such as spring **24** or other suitable vibrating support forming part of the machine and connected to the balance computer **60** by lead **67** as diagrammatically illustrated in FIG. 3.

The Office Action rejected Claim 22, asserting that the workpiece holding device or chuck **14** of Wharton meets the gripping device comprising a gripper head supporting gripping means, as recited in the claims. The Office Action asserted that Wharton's balance computer meets the claimed detection system, that Wharton's unbalance injection device meets the pulse

emitter of the claims, and that Wharton's vibration sensors or velocity transducers meet the claimed vibration sensor. As for the memory and/or analytical module of the claims, the Office Action asserted that Wharton's balance computer and its memory meet this claim feature.

Wharton's unbalance injection device does not meet the claimed pulse emitter *acting upon the workpiece to excite vibrations in the workpiece*. Wharton's unbalance injection device **42** has a pair of interior counter-weight rings **44, 46** (FIG. 1a) operatively mounted to a rotatable upper, axially-extending shaft portion of the spindle or to the rotatable workpiece holding unit **14** of the spindle. The unbalance force injection unit further comprises a driver **48** having a coil assembly **50** spaced from and disposed outwardly of the rings **44, 46** mounted on a housing of the spindle or other stationary component **52**. When a predetermined unbalancing load is required for calibrating purposes, electronic controller **54** (FIG. 3) is activated by the balance computer **60** to initiate load injections on signals transmitted from the balance computer through line **59** connecting the controller to the balance computer. The controller **54** is accordingly operative to send power pulses to the coil assembly of the driver **48** of the unbalance injector device and effect the electromagnetic rotational stepping of the counter-weight rings **44, 46** to different predetermined rotary positions. Rotation of the rings to different preestablished positions results in the application or injection of a predetermined imbalance load into a base or injection plane IP extending *through the workpiece holding end of the spindle*.

Thus, Wharton's unbalance injection device **42** does not act *upon the workpiece* to excite vibrations in it. Rather, it acts upon the spindle **16**.

Furthermore, Claim 22 further requires that *the detection system and the memory and/or analytical module jointly form a component part detachably arranged on the gripper head.* Wharton does not teach or suggest that his balance computer **60** along with a detection system jointly form a component part detachably arranged on a gripper head. Wharton says that "As diagrammatically illustrated in FIGS. 1 and 3, the work piece balancing machine **10** has a balance computer **60** associated therewith" (col. 7, lines 1-3). Wharton is entirely devoid of any

teaching that would suggest the claimed arrangement of the memory and/or analytical module *detachably* arranged *on the gripper head.*

Thus, for at least these reasons, Wharton fails to anticipate Claim 22 or its dependent claims.

Additionally, while Wharton teaches that a controller **52** is connected to the balance computer **60** via a "line **59**" (col. 6, line 27), nothing in Wharton teaches or suggests the claimed feature of the component part (detection system and memory/analytical module) being detachably arranged on the gripper head and *in communication with a controller of the manufacturing plant via a bus system comprising an ASi bus*. Applicant respectfully disputes any interpretation that a "line" or "cable" would have suggested the particular usage of an ASi bus. A cable is a simple device that transmits signals, while a bus system (as known by those skilled in the art) transmits signals and also performs more-complex tasks such as collision detection, security issues, and transmission handling/addressing, for example. A person of ordinary skill in the art would not consider a "line" or cable as teaching a bus system in the particular context of the claimed invention.

For at least these reasons, Wharton fails to anticipate any of Claims 22-28.

With respect to the dependent claims, there are also further reasons why Wharton fails to suggest the claimed invention. Claim 23 requires that the pulse emitter be provided with a piezo sensor. The Office Action stated that "Wharton teaches a robot wherein the pulse emitter is provided with a (piezo sensor) which does not have any patentable weight for it is a design choice." First, Wharton does not teach any robot, but rather a rotating balancing machine. Second, Applicant has amended Claim 23 to clarify the purpose and function of the piezo sensor. In particular, the claim now recites that <u>the pulse emitter has an impact tappet that strikes the workpiece seized by the gripping device with a preset striking pulse with a preset energy and</u> the pulse emitter is provided with a piezo sensor <u>for determining the acceleration of the impact tappet impacting the workpiece and for determining the delay after the pulse has been applied</u>.

Applicant submits that Wharton fails to teach or suggest these additional features of Claim 23. As noted above, Wharton's unbalance injection device **42** injects a predetermined imbalance load into a base or injection plane IP extending *through the workpiece holding end of the spindle*. Thus, Wharton's unbalance injection device does not strike the workpiece as claimed in Claim 23, and thus Claim 23 is patentable over Wharton for these further reasons.

Claim 25 is similar to Claim 23 in that it recites that the pulse emitter is formed by a striking tappet acted upon by kinetic energy, and is patentable for similar reasons. The system according to Claim 25 has to deal with vibrations that are entirely different from the unbalance mass distribution vibrations in Wharton that cause the entire workpiece to vibrate when rotated at a predetermined rotational speed. In contrast to such unbalance type vibrations, the vibrations imparted to the workpiece by the striking tappet of Claim 25 have a specific point of origin on the workpiece surface and travel as vibrational or acoustic waves from that point of origin through the workpiece. By analyzing the spectrum of the vibrations as sensed by the vibration sensor(s), it can be determined whether more than one workpiece has accidentally been picked up (because they have become stuck together). Wharton fails to disclose anything that remotely suggests using a striking tappet, with its attendant functions and advantages, in accordance with Claim 25.

Claim 26 recites that the vibration sensor is formed by an acceleration sensor arranged to be placed *onto a surface of the workpiece*. Nothing in Wharton would have suggested such an arrangement. Indeed, since Wharton's machine rotates the workpiece about an axis, it is not seen how an acceleration sensor even <u>could</u> be arranged so as to be placed onto a surface of the workpiece. Accordingly, Claim 26 is patentable over Wharton for this further reason.

<u>Claims 29-30</u>

The invention defined by independent Claim 29 relates to a method for feeding workpieces from a stack of workpieces to a metal sheet folding machine for reshaping the workpieces by folding with a manipulation system, comprising the steps of:

gripping a workpiece at a top of the stack of workpieces using a gripping device;

lifting the gripped workpiece up from the stack with the gripping device;

exciting vibrations in the lifted workpiece using a pulse emitter arranged on the gripping device and acted upon by a controller;

sensing the vibrations in the workpiece using a vibration sensor arranged on the gripping device;

recording signals from the vibration sensor in a memory and/or analytical module; and

comparing a vibration spectrum of the workpiece stored in said module with reference vibration data;

wherein the vibration sensor is applied to a surface of the workpiece by a contact pressure-exerting device, whereupon a pulse is applied to the workpiece by the pulse emitter with a contact time of about 200 ms for exciting vibrations.

Wharton fails to disclose or remotely suggest such a method. Wharton's balancing machine does not grip a workpiece at a top of a stack of workpieces using a gripping device, and clearly there is no step of lifting the workpiece up from the stack with the gripping device. Rather, a person manually loads a workpiece into Wharton's chuck **14** and the balancing machine then rotates the spindle **16** and chuck **14** about an axis.

Additionally, nothing in Wharton would have remotely suggested exciting vibrations in a workpiece after the workpiece has been lifted from a stack of workpieces. In the claimed invention, this procedure allows the workpiece to be decoupled from and thereby unaffected by the other workpieces in the stack so that the vibrations detected in the workpiece are due only to the gripped workpiece (and possibly another workpiece stuck thereto). Only in this manner is the memory/analytical module able to determine characteristics of the gripped and lifted workpiece (such as whether multiple workpieces have stuck together, or whether the gripped workpiece is the correct one). Wharton does not remotely suggest this aspect of Claim 29.

Moreover, the method of Claim 29 requires that the vibration sensor is applied *to a surface of the workpiece* by a contact pressure-exerting device, and that a pulse is applied to the

workpiece by the pulse emitter *with a contact time of about 200 ms* for exciting vibrations. These aspects are also not disclosed or suggested by Wharton. Wharton's balancing machine works in an entirely different way because its objective is entirely different. As noted, Wharton does not apply any pulse to the workpiece, nor does he apply a vibration sensor to a surface of the workpiece. Wharton's vibration sensors (see vibration pickup **66** in Fig. 1, for example) are arranged so that the vibration that is detected is that of the spindle **16** rather than of the workpiece itself. Furthermore, as noted, the character of the vibrations is entirely different from those imparted in the workpiece by the pulse emitter that applies a pulse to the workpiece with a contact time of about 200 ms.

For at least these reasons, it is submitted that Wharton fails to disclose or suggest the method of Claim 29.

Claim 30 recites that the comparing step comprises comparing the vibration spectrum with reference data so as *to determine whether one or more additional workpieces is/are stuck to the workpiece gripped by the gripping device*. This is neither disclosed nor remotely suggested by Wharton. <u>If</u> another workpiece were stuck to the workpiece **12** loaded in the chuck **14** of Wharton's balancing machine, it would quickly become unstuck (with possibly dangerous consequences!) as soon as the chuck started rotating the workpiece **12**. Thus, Claim 30 clearly is patentable over Wharton.

<u>New Claims 31 and 32</u>

New Claims 31 and 32 depend from Claim 22 and recite that the memory and/or analytical module is structured and arranged to record signals from the vibration sensor, and to compare a vibration spectrum of the workpiece with reference vibration data so as to determine whether one or more additional workpieces is/are stuck to the workpiece gripped by the gripping device (Claim 31), or to compare a vibration spectrum of the workpiece with reference vibration data so as to determine via the vibration spectrum whether the seized workpiece is the correct part (Claim 32).

Wharton does not disclose or suggest a gripping device in accordance with these claims. With respect to Claim 31, the previous remarks in connection with Claim 30 apply here as well. With respect to Claim 32, Wharton's balancing machine does not have any objective or capability of determining whether the workpiece **12** loaded in the chuck **14** is the correct part. Indeed, it would probably be impossible to determine from unbalanced load vibrations sensed in the spindle **16** whether the workpiece **12** is the correct part. Therefore, Claims 31 and 32 are patentable over Wharton.

Conclusion

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefor (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,

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